

# 'Speed gene' in modern racehorses originated from British mare 300 years ago

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Scientists have traced the origin of the 'speed gene' in Thoroughbred racehorses back to a single British mare that lived in the United Kingdom around 300 years ago, according to findings published in the scientific journal *Nature Communications*.

The origin of the 'speed gene' (C type myostatin gene variant) was revealed by analysing DNA from hundreds of horses, including DNA extracted from the [skeletal remains](#) of 12 celebrated Thoroughbred stallions born between 1764 and 1930.

"Changes in racing since the foundation of the Thoroughbred have shaped the distribution of 'speed gene' types over time and in different racing regions," explained Dr Emmeline Hill, the senior author of the study, and a genomics scientist at the School of Agriculture and Food Science, University College Dublin.

"But we have been able to identify that the original 'speed gene' variant entered the Thoroughbred from a single founder, which was most likely a British mare about 300 years ago, when local British horse types were the preeminent racing horses, prior to the formal foundation of the Thoroughbred racehorse."

The international scientific team led by scientists from University College Dublin (UCD), Equinome Ltd., and the University of Cambridge, have traced all modern variants of the original 'speed gene' to the legendary Nearctic (1954-1973), and attribute the wider expansion

of these variants to Northern Dancer (1961-1990), the son of Nearctic, and one of the most influential stallions of modern times.

"Having first identified the 'speed gene' in 2010, we decided to see if we could trace the origin of the gene variant using [population genetics](#) coupled with pedigree analysis. We wanted to understand where speed in the Thoroughbred came from."

Dr Hill is also a co-founder of Equinome, a UCD spin-out company headquartered at NovaUCD, which has developed The Equinome Speed [Gene Test](#). This test is currently being used by the global bloodstock and racing industry to identify the optimum racing distance for individual Thoroughbred horses.

"We traced the economically valuable gene variant by determining 'speed gene' type in almost 600 horses from 22 Eurasian and North American horse breeds, museum bone and tooth specimens from 12 legendary Thoroughbred stallions, 330 elite performing modern Thoroughbreds from 3 continents, 40 donkeys and two zebras" added Dr Hill.

According to co-author Dr Mim Bower from the University of Cambridge, UK, "The findings point to a British mare as the most likely single founder of the original 'speed gene' because one of the lines of evidence from the research demonstrated that the prize stallions of the 17th and 18th centuries had two copies of the T type speed gene variant (T:T) which is linked to greater stamina."

"At this time in the history of horse racing, races were between two horses competed over multiple heats, at distances of between two to four miles, and repeated until a horse had won the event twice or 'distanced' the opponent. Horses did not race until they were five or six years old, and then only two or three times in their lives. This is consistent with

these horses being T:T types.", said Dr Bower

An increased premium on speed and precocity developed as two-year-old races became popular during the last century, and in many regions of the world, these preferences remain to this day.

Dr Hill explained, "For example, in Australia, the myostatin 'speed gene' type (C:C), which is best suited to fast, short-distance, sprint races, is more common and there is a market driven demand for horses with at least one copy of the C type gene variant."

"This just goes to show the power breeders have to shape the genetic make-up of their horses. Decisions regarding the race pattern in each racing jurisdiction and the commercial demand for certain types will also rapidly influence the genetic make-up of the population."

To identify where the C type gene variant originated, the researchers analysed DNA samples from more than 20 horse breeds that included representatives of local British and Irish horses, from where female Thoroughbred lineages derive, and exotic eastern populations from where male Thoroughbred lineages derive.

The study identified the Shetland breed as having the highest frequency of the C type [gene variant](#). The Shetland represents local British horse types, which were the preeminent racing horses prior to the formal foundation of the Thoroughbred.

By comparing the diversity of the chromosomes around the C and T type gene variants researchers found only a single C type compared to 11 different T type gene variants, meaning that the 'speed gene' entered the Thoroughbred just once.

"The results show that the 'speed gene' entered the Thoroughbred from a

single founder, which was most likely a British mare about 300 years ago when local British horse types were the preeminent racing horses, prior to the formal foundation of the Thoroughbred racehorse." said Dr Hill.

Collaborators in the study were scientists from Trinity College Dublin, the Russian Academy of Sciences and the Swedish University of Agricultural Sciences. The research was supported by grants from The Horserace Betting Levy Board, Leverhulme Trust, Cambridge Overseas Trust and Science Foundation Ireland.

"I am very grateful for the support of our research. Ireland has been renowned as a leader in the production of world class racehorses for generations, and continues to lead now in the application of new scientific technologies in breeding and racing. We are seeing a shift globally to scientifically informed decision-making." said Dr Hill.

Provided by University College Dublin

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